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Review Article

A Review on Techniques of TMJ Arthrocentesis

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ABSTRACT

The Temporomandibular joint complex is one among the maximum captivating, complicated synovial joint with inside the body. Tmj movements are regulated through a difficult neurological mechanism that is vital to perform the characteristic features efficiently. Absence of such concord may result in structural harm or disruptive muscle conduct in any components. TMD has become common in recent years due to change in lifestyle and stress is also considered to be etiological factors. In the tmj dysfunction and the control of refractory pain poses task to maxillofacial surgeon. To overcome dysfunctions wide range of treatment modality like preventive and surgical procedures like arthroscopy and arthrocentesis are used. In which arthrocentesis is widely accepted. Tmj arthrocentesis is a minimally invasive and a simple method which might be used in preference to extra invasive methods in sufferers having pain due to failure of response to preventive treatments. This procedure is performed under administration of under local or generalized anesthesia. This overview offers a complete evaluate of literature approximately the diverse technical and prognostic components when it comes to arthrocentesis of tmj, and each practitioner have to recollect this attention while acting this system in treating sufferers with temporomandibular disorders.

Keywords: Temporomandibular Joint (TMJ); Arthrocentesis; Minimally invasive surgery

INTRODUCTION

Temporomandibular Joint (TMJ) acts like a sliding hinge which join skull to the mandible. It is highly mobile bilateral articulations formed by two bony articular surfaces the glenoid fossa lying on petrous temporal bone and condylar head of mandible. Soft tissue components include Temporomandibular capsule enclosing the joint which lined by synovium which secrets lubricating synovial fluid , articular disc or meniscus which attached to the capsule and positioned inbetween the glenoid fossa and condyle of mandible and ligaments which includes stylomandibular ligament, sphenomandibular ligament, lateral pterygoid muscle and temporomandibular ligament [1]. The neurological mechanism regulates the movements of TMJ. Mastication acts like an oral motor reflecting Central Nervous System (CNS) commands, with many sensory peripheral inputs resulting in rhythemic jaw movements. There are wide ranges of TMJ disorders. It is a common disorder of musculokeletal origin in orofacial region. Trauma to the mandible or joint itself and other general health conditions contributes as etiologic factors for example: arthritis, erosion of joint, habitual grinding, structural jaw problems [2]. Change in lifestyle and stress have also been considered as etiologic factors. About 5 to 15 percent of population suffers from tmj disorders and estimated prevalence is about 50 percent of population but only 2 percentage of population seek treatment [3]. Causes signs and symptoms have a wide range. There various etiologic factors are:

- Systemic factors (Genetic disorder, systemic disorder, psychological disorders).
- Initiating factors (Trauma, parafunctional habits).
- Perpetuating factors (Metabolic-problems, mechanical and muscular stress).

Decades before malocclusion, stress, psycho-physiological concepts were the main etiological factors. Some of the main symptoms are clenching, nerves associated with chronic facial pain, difficulty in opening mouth typically mandible. Prompt diagnosis can help in appropriate management. Depending

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upon the signs and symptoms, appropriate diagnosis is derived and treatment is planned [4].

Treatment modalities

It is mainly divided into two groups those are as follows:

Preventive: Pharmacological treatment, physiotherapy, bite guard, stress management [5].

Surgery: It is of various types-

- Arthrotomy (exploration of joint through surgery).
- Arthroplasty (surgical procedure to restore the function of the joint).
- Replacement of a part of tmj or total joint replacement.
- Minimal invasive (procedure that is performed through tiny incisions instead of a large opening).

Some examples of minimal invasive are as follows-

Arthroscopy: Through the use of an arthroscope, a technique for direct visual evaluation of internal joint structures and surgical operations.

Arthrocentesis: DW Nitzan first described tmj arthocentesisis a procedure in which joint space lavage is carried out using sterile irrigators and needles so as to lessen the pain by abolishing inflammation from the joint without visualizing the joint [6]. Technique consists of introducing a pair of needles in upper space of joint and followed by lavage using Ringer's solution or saline to break down adhesion and to flush down inflammatory mediators for the re-establishment of normally opening of the jaw [7,8]. Temperomandibular joint arthrocentesis utilized in each instances of acute closed jaw lock and diverse remedies of Temeperomandibular Disorder's (TMD). After washing off upper joint space acid hyaluronique component of synovial fluid is responsible for viscosity and increase lubrication after injecting into upper joint space to relieve pain. We must take into consideration during the process of arthrocentesis the position of disc is not revised. It is generally preferred in patient's not responded to non-surgical treatments. Not just is acute closed jaw lock treatment, also in various other TMD's arthrocentesis is used as a treatment. It has been considered as first line surgical treatment. Major indications are

- Opening of jaw limitations acute and chronic
- Anterior displacement of disc with reduction and wide range of motion with chronic pain,
- Degenerative osteoarthritis
- TMJ open jaw locks condition where condyle is entrapped anterior to a lagging disk.
- Intra-articular infection
- Inflammatory-diseases
- Laceration

Arthrocentesis is commonly preferred and become popular due to following reasons : it is a simple, non-invasive , inexpensive, does not require much instrumentation ,highly effective procedure ,has minimum complications, can be performed repeatedly. Apart from having a low morbidity rate the overall success rate 87.1% [9]. Arthrocentesis is contraindicated in patients with peri-auricular cellulitis as it will end up introducing bacteria into the joint space resulting is compelling the condition. Hemarthrosis it is a localized swelling in affected area shows little evidences in studies so far [10].

Procedure

Depending on patient's history and surgeon's treatment plan. Arthrocentesis can behold comfortably by using localized or generalized anesthesia or through intravenous conscious sedation. It is a minimally invasive procedure [11]. To make procedure successful appropriate preparation is mandatory.

General requirements: Armamentarium, Antiseptic solution (betadine, chlorhexidine, etc.), Sterile gloves, Drapes, Guaze.

Syringes and needles: For introducing Local Anesthesia (3cc -5cc syringe, 25-27 gauge needle); for aspiration of fluid aspiration (10cc-20cc syringe, 18-22 gauge needle).

Local anesthesia: Medications to inject into joint if required, for draining of large amounts of fluid 3 way stopcock, for laboratory studies (specimen collection tubes), Hemostat .

Drugs: Inj hyaluronic acid, Ringer's lactate, Opiods and Nonsteroidal anti-inflammatory drugs used till date are (example- COX-2 inhibitors, Morphine, Tenoxicam, Tramadol, Buprenorphine, Fentanyl).

TECHNIQUES

Ultrasound or X-rays are used to guide the procedures. Following procedures should be taken into consideration before going for surgery.

- Surgical field should be isolated and cleaned using Povidone iodine or similar substances specially the ear and preauricular region.
- External auditory canal should be conserved from fluid and stagnation of blood using cotton pledget.
- The Auriculotemporal nerve block should be given to joint penetrating region.

Two needle technique

It is a traditional method used to execute temperomandibular joint arthrocentesis. This procedure uses 2 needles for injecting and aspiration of solution respectively [12]. A line joining canthus of ipsilateral eye to the medial portion of tragus of ear is drawn on the skin. This line has 2 needle insertion locations noted on it. At a distance of 10 mm from the tragus and 2 mm inferior to the canthotragal line, the initial, more posterior point will be marked. This position corresponds to the glenoid fossa's posterior limit. The articular eminence height is indicated anterior at 20 mm to the tragus and 10 mm inferior to second point canthotragal line [13]. The glenoid fossa is very thin, measuring between 0.5 mm and 1.5 mm. Underneath the glenoid fossa is the dura and temporal lobe. Degenerative arthritis or prior infections can potentially destroy joints. As a result, it's probable that this structure will be perforated during the process. As a result, the surgeon must exercise caution when inserting the needle into the joint region. To reach the top joint space, a depth of about 25 mm is sufficient.

During the procedure of arthrocentesis treatment is typically requested to open their mouth and turn it to the other side, thus distracting condyle from the glenoid fossa and increasing joint space. With the patient's mouth open when end of needle comes in contact with articular eminence's posterior wall, the first needle is put in most posterior position deep around 20-25 millimeter into the superior joint, directed inward, upward, and ahead. It is accompanied by irrigating solution (Ringer's lactate solution or physiological saline). This compartment will absorb to 5ml of fluid. Now, into the inflated section the second needle is inserted in front of first needle at marked position, allowing imaging of the solution and orienting the joint flow to irrigation solution.

Laskin stated it's generally complicated to put 2nd needle before 1st and so had to place the anterior needle into the superior joint compartment posteriorly by placing it 3 mm in front of the first [14]. He put forward that this technique was simpler than the old method. If 2nd needle is inserted before 1st, it's placed in the tapered space of higher chamber of joint, which can damage the joint disc and cause a failure in the outflow of the irrigated solution. Alkan and Etoz had put forward a new idea, in which the dorsal opening of the first needle was the same although the second needle was placed seven millimeter in front of center of the tragus and two millimeter below, with the cantotragal line [15]. 2nd needle was parallelly and 3 mm posteriorly adjusted to the first uptill the contact was established with the bone. It has been hypothesized that, during the placement of 2nd needle behind first in the broader part of upper compartment of joint, the exit of solution from joint cavity is easily obtained. IT painstakingly irrigated numbers of joints successfully using this procedure and advised that using landmark as technique, while backtrack may be rational, because recurrent placement of needle will be unpleasant for clinicians and patients both and will negatively impact success rate of treatment.

Placing 2 needles in joint cavity can be uncomfortable for the patient, especially during first irrigation. Study to evaluate the effectiveness and acceptability of a cycle after 5 weekly injections of hyaluronic acid a classic arthrocentesis showed that patient's prospect of acceptability has increased over time. One practicable explanation for this is, in sequential arthrocentesis procedures, catabolites are removed and adhesions are broken, facilitating needle insertion and thus improving the quality of the follow-up treatment process. A method using single needle for both injection and expulsion of irrigation solution has recently been reported and has shown interesting results in very short period of time [16].

Single needle technique

The approach of lavaging the temporomandibular joint by single needle technique was based on creating high pressure to loosen joint adherence when patient mouth is open and permits movement of fluid to flow by injecting saline in upper joint compartment with close mouth of patients. The method using single needle injects fluid under negative pressure to expand joint movement and break the joint adhesions,. Procedure should be repeated till ten times for a total amount of approximately 40 ml. Single needle technique is advised for hypomobile joints or changes in degenerative joints which make second needle placing difficult [17].

There are various advantages of single needle technique over two needle technique:

- It is a less invasive, easier and simple technique.
- When inserting second needle in 2 needle technique the positioning of it should stabilize and interfere to provide stable access to joint cavity.
- Post-operative facial nerve paresthesia can be reduced by single needle technique since there is reduced post-operative pain and discomfort to patient which is expected to lessen quantity of anesthesia needed.

Various new methods have been introduced with time to overcome traditional technique to make it simpler and more effective:

Single puncture arthrocentesis: Procedure is fast, minimally invasive, less traumatic, and safe.

There are further two types SPA-

Type 1 SPA: Single needle cannula method in these technique both inflow and outflow goes through same single lumen and cannula.

Type 2 SPA: Double needle cannula or dual needle cannula method: In these method both in and out flow goes through same needle cannula but enters in different ports and lumen.

Double puncture arthrocentesis: With automatic irrigation Alkan and Kilic modified the traditional technique the modified procedure involves connection of a pump irrigator from implant motor surgically to 2nd needle, leading to high pressure automatic [10].

Concentric needle unit: Use of 2 different gauge needle places in tmj in concentric manner for SPA results in feasible, less traumatic and effective method for TMJ lavage.

DISCUSSION

Today temporomandibular diseases are the complex term used to designate structural and functional dysfunction [9]. Temporomandibular disorders has become very common due to various etiological factors joint erosion, trauma, parafunctional habits, etc. According to reports class 2 verticle cases has also reported to cause TMD it is an unusual condition of facial condition. Oral precancerous lesion also contributes to TMD [7]. To treat this various treatment modalities are being practiced. Surgical management of such conditions is done mainly by arthroscopy and arthrocentesis. Arthrocentesis is preferred over arthroscopy due to its fair result and less complication compared to arthroscopy. In arthroscopic surgery fine needle arthroscope is inserted in tmj through small skin puncture just near the ear and many similar skin punctures may be required depending on condition whereas in arthrocentesis there is washing off inflammatory mediators using 2 needles and is an easier procedure as compared to arthroscopy. Therefore TMJ arthrocentesis is the most widely used primary

therapy. It is minimally incursive method carried out under local or generalized anesthesia with or with sedation the main moto of this procedure is to clear pain mediators, debris, blood which are the consequences of intra-articular inflammation. Recovering is is possible through arthrocentesis since it is capable of opening the mouth to normal, function disorders and pain. It is simple procedure in patients irresponsible to conservative treatment. The fluid injected during arthrocentesis improves joints mobility through releasing adhesions. The success rate so far has varied with time but it is constantly observed that success rate of arthrocentesis is more than conservative treatment.

In the article arthrocentesis a minimally invasive technique for management of TMDs is bridging the gap between Non-Surgical and Surgical Treatment the success rate 87.1% over 55.9% (non-surgical). According to Emshoff is most successful in subjects that are below 25 years of age an invasive course of action is performed in, meanwhile no procedure is carried out in the other groups; therefore placebo effect might be contributory. According to Randomized Controlled Trials (RCTs), arthrocentesis is successful procedure for reducing pain and increase in mandibular mobility with the help of imaging such as ultrasound, where physical modalities, conservative and occlusion appliance therapy has failed. Intra-capsular addition for steroid (triamcinolone acetonide) and Platelet-Rich Plasma (PRP) as a supplement. Arthrocentesis is been supported by small number of moderate to high-quality of data RCT. Moderate grade evidence RCTs haven't indicated that Hyluronic acid (HA) supplementation is effective.

CONCLUSION

TMJ arthrocentesis looks to be a straightforward, minimally invasive, low-cost, and very successful technique. It's plan of action having low risk of problems and is clinically beneficial. Because of these characteristics, arthrocentesis is a viable therapy choice in patients with TMJ issues failed to respond to nonsurgical or preventive treatments.

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